

Roll No.

24290

B. Tech 5th Semester (Civil Engg.)

Examination – December, 2011

SOIL MECHANICS

Paper : CE-307-F

Time : Three hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all. Question No. 1 is *compulsory* and hence attempt *one* question from each section. All questions carry equal marks. Neat and lucid answers will merit more. Assume missing data wheresoever necessary.

1. Complete the statements given below by filling the blanks/Give short answers : $10 \times 2 = 20$

- (i) Define shear strength of soil.
- (ii) Cohesionless soils are formed due to
- (iii) Soils are derived formed

- (iv) As per IS : specific Gravity is the ratio of density of soil solids to that of water at a temperature of
- (v) Darcy's equation is valid for
- (vi) Pore water pressure is known as
- (vii) Consolidation occurs faster in
- (viii) Square root of time fitting technique is used for calculation of
- (ix) Range for OMC for clays is
- (x) Coefficient of compressibility is defined as the

SECTION – A

2. (a) What are the various principal clay minerals? 8
- (b) Derive relation between void ratio and porosity for (i) dry soil mass and (ii) fully saturated soil mass. 12
3. (a) Explain salient features of plasticity chart. 8
- (b) What is the purpose of soil classification? Explain how soil are classified according to IS soil classification system. 12

SECTION - B

4. A clay stratum of thickness 8 metre is placed at a depth of 6 metre below the ground surface, overlay by fine sand. The water table is 2m below ground surface. For fine sand, submerged unit weight is 10.2 KN/m^3 . The moist unit weight of sand above water table is 16 KN/m^3 . For clay layer, $G = 2.67$ and water content is 25%. Compute the Effective Stress at middle of clay layer. 20
5. State Darcy's law with its limitations. If during variable head, permeability test on a soil sample, equal time intervals are noted for head drop from h_1 to h_2 and h_2 to h_3 ; find the relation between h_1 , h_2 and h_3 . 8 + 12

SECTION - C

6. An elastic medium carrier at its surface a uniform load of 250 KN/m^2 covering a rectangular area $4^m \times 3^m$. Find the vertical stress, at a depth of 5^m below the centroid of area (assume Boussinesq Influence Factor for one quadrant = 0.474) 20
7. (a) How does consolidation differ from compaction of soil? Describe it. 8
- (b) List the assumptions made in deriving Terzaghi's one dimensional consolidation theory. 12

SECTION - D

8. (a) Define shear strength. Explain advantages of Tri-axial Shear Test over Direct Shear Test. 2 + 8

(b) Write short notes on : 5 + 5

(i) Unconfined Compression Test.

(ii) Relation between principal stresses at failure and shear strength parameters.

9. (a) Write short notes on : 3 + 3 + 3

(i) Active Earth Pressure,

(ii) At rest Earth Pressure,

(iii) Passive Earth Pressure.

(b) For a clay back-fill behind a retaining wall, what is the depth of tension crack ? How is total active earth pressure calculated ? 11
